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NUMERIC KEYPAD TECHNICAL PROCEDURES

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NUMERIC KEYPAD

P3

A7

APPLE MOTHER BOARD

PIN 1 OF P2
(INTERFACE BOARD)
TO MATCH
PIN 1 OF A7
(APPLE MOTHER BOARD)

FIGURE   A

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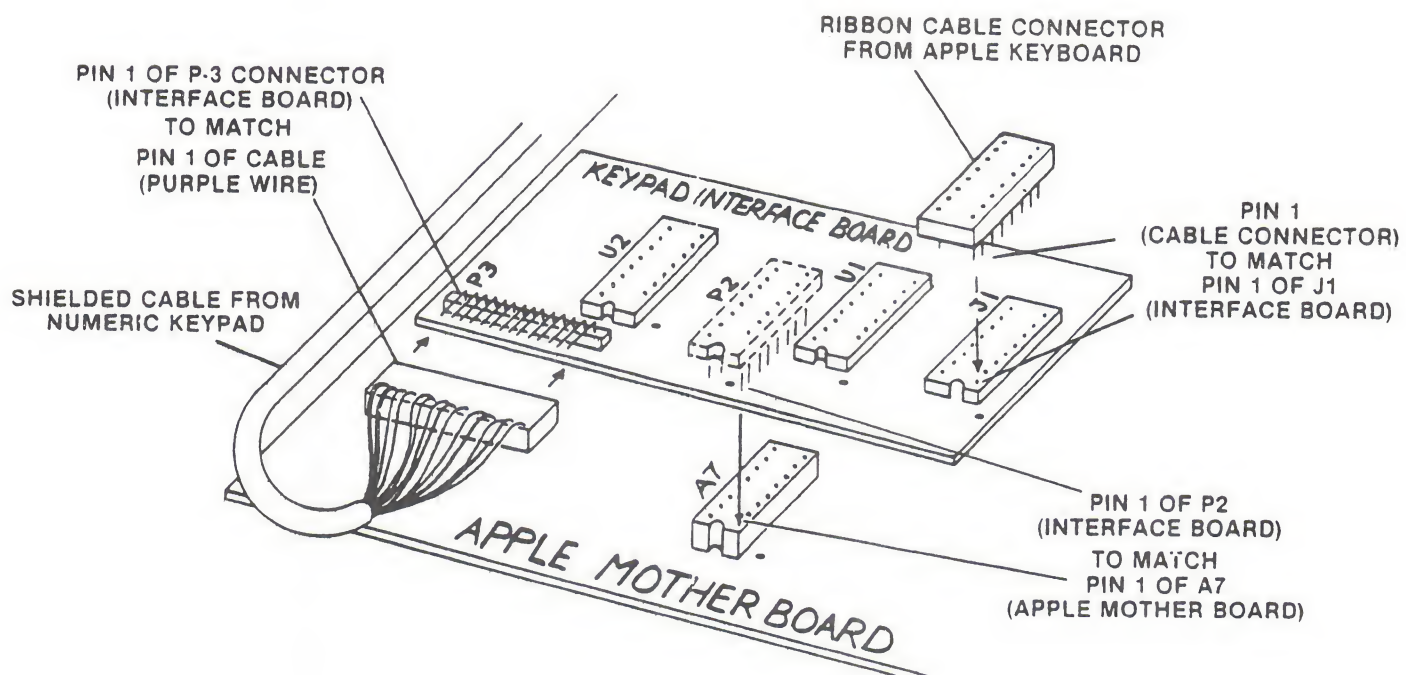## A. TROUBLESHOOTING GUIDE FOR THE NUMERIC KEYPAD

NOTE: The special function keys (arrows, return, etc.) on the Numeric Keypad do not work properly when used with an Apple //e containing a "revision C" character generator ROM. The Revision C ROM (part number 342-0132-C) was first shipped in the Apple //e after 8/25/84. If you encounter difficulties with the function keys on the Keypad, check to see if the Apple //e logic board contains the "revision C" ROM at location E-12. If it does **REPLACE THE CHARACTER GENERATOR ROM** with any other version from service stock (for example; part numbers 342-0132-A or 342-0132-B). **DO NOT REPLACE THE ENTIRE APPLE //e LOGIC BOARD.**

1. Confirm that the keypad is malfunctioning by running the keyboard test on the Dealer Diagnostic diskette.

When you have isolated the malfunction to the numeric keypad, determine the failed component by performing the following steps:

2. Complete steps 1a. through 1i. of ASSEMBLY/DISASSEMBLY INSTRUCTIONS (on following pages) to gain access to and remove the keypad interface board.

3. Swap the interface board with a known good unit (from spares kit), reconnecting pins and cables as shown in Figure A.

4. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, put the old interface board back in and go to the next step.

5. Swap the cable, following steps 1j and 2 to 12 of the Assembly/Disassembly instructions. (see reminder below)

6. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, remove the new cable and use the old cable in the next step.

7. Swap the keypad assembly following steps 7 to 12 of the Assembly/Disassembly instructions. (see reminder below)

8. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble it and the Apple II (steps 13 to 15 of the Assembly/Disassembly intructions). The pad SHOULD work. If it doesn't, you have defective exchange modules. Find new exchange modules and start from step 3 above.

REMINDER: Before swapping ANY unit on the numeric keypad, POWER DOWN THE SYSTEM AND REMOVE THE POWER CORD FROM THE APPLE.
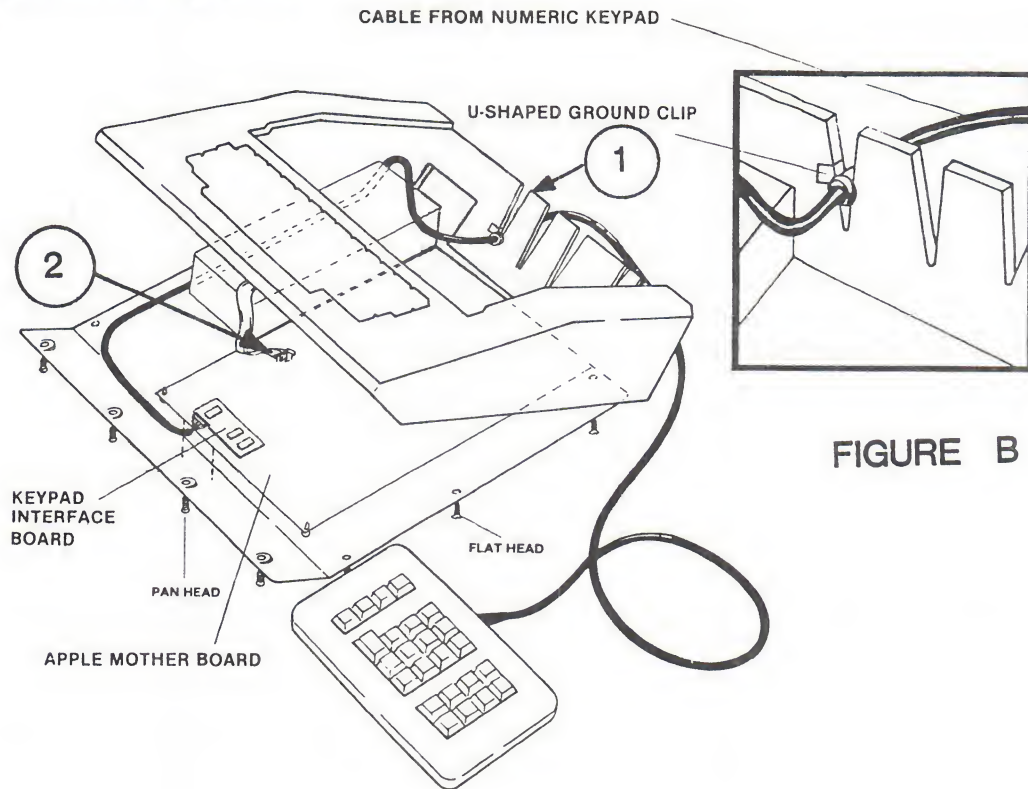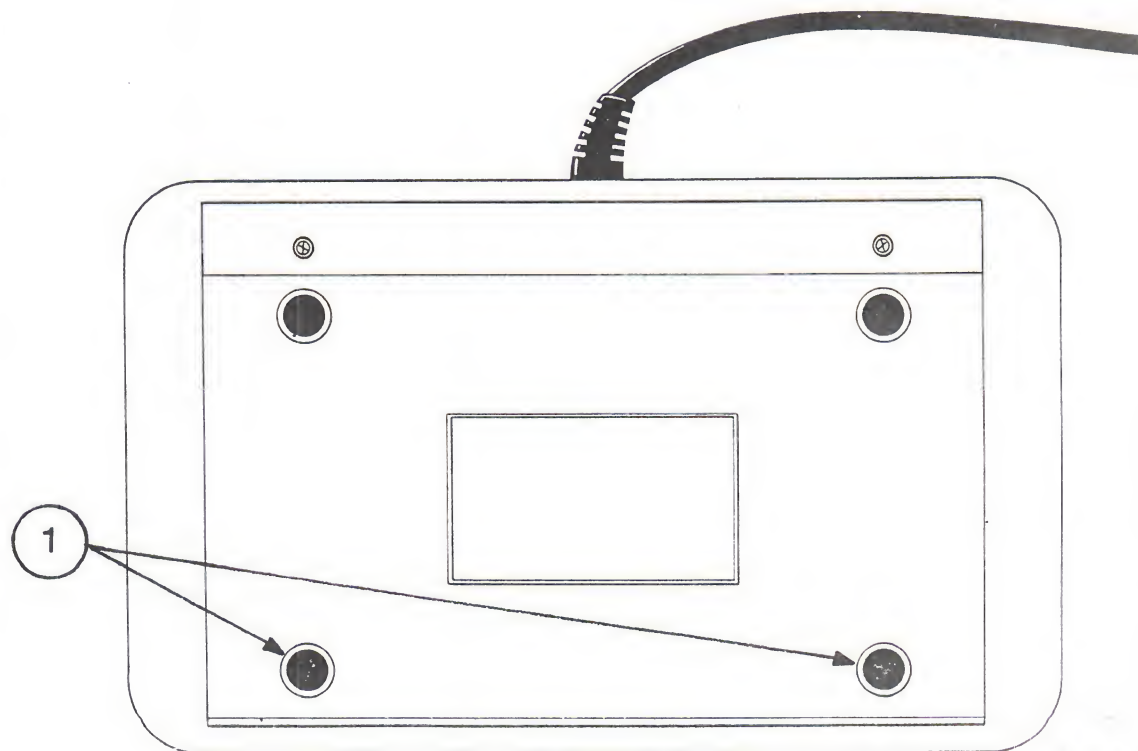
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CABLE FROM NUMERIC KEYPAD

U-SHAPED GROUND CLIP

1

2

KEYPAD
INTERFACE
BOARD

PAN HEAD

FLAT HEAD

APPLE MOTHER BOARD

FIGURE B

FIGURE C

1

1

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B. ASSEMBLY/DISASSEMBLY INSTRUCTIONS FOR THE NUMERIC KEYPAD

Items needed:

Dealer Diagnostic diskette
Medium Phillips screwdriver
Soldering iron, solder, solder wick
Replacement modules (interface card, cable, keypad assembly)
Foam pad

DISCONNECTING KEYPAD FROM APPLE

1. Complete these steps to disconnect the numeric keypad from the Apple.

   a. Power off the system and remove power cord -- first from the wall source and then from the rear of the Apple Housing.
   b. Remove Apple lid. Except for keypad cable, disconnect all other external cables connected to the Apple.
   c. Turn Apple upside down so keyboard rests on protective foam pad.
   d. Remove six flat-head screws from three outside edges of flat portion of Apple base.
   e. Remove four pan-head screws and lock washers from front of base.
   f. Holding both base and housing, turn Apple right side up. (On newer Apple II's, it may be necessary to additionally remove four round head-screws and lock washers along the rear of the Apple that fasten the mother board to the base.)
   g. Gently lift the front of the housing slightly off the base and unplug keyboard connector (see Figure B, #2) from keypad interface board.
   h. Grasp keypad interface board firmly and gently lift from motherboard.
   i. Lift housing off base and set aside (careful - keypad cable still attached)

   Do NOT proceed to next step unless you are swapping the cable or keypad assembly. Return to #3 of Troubleshooting Guide.

   j. Unthread cable through notch in rear of Apple. (see Figure B, #1)

SWAPPING THE CABLE & KEYPAD ASSEMBLY

2. Remove the 2 exposed Phillips screws on bottom of keypad case.

3. Remove the 2 LOWER rubber feet. They just pry off. (See Figure C, #1)

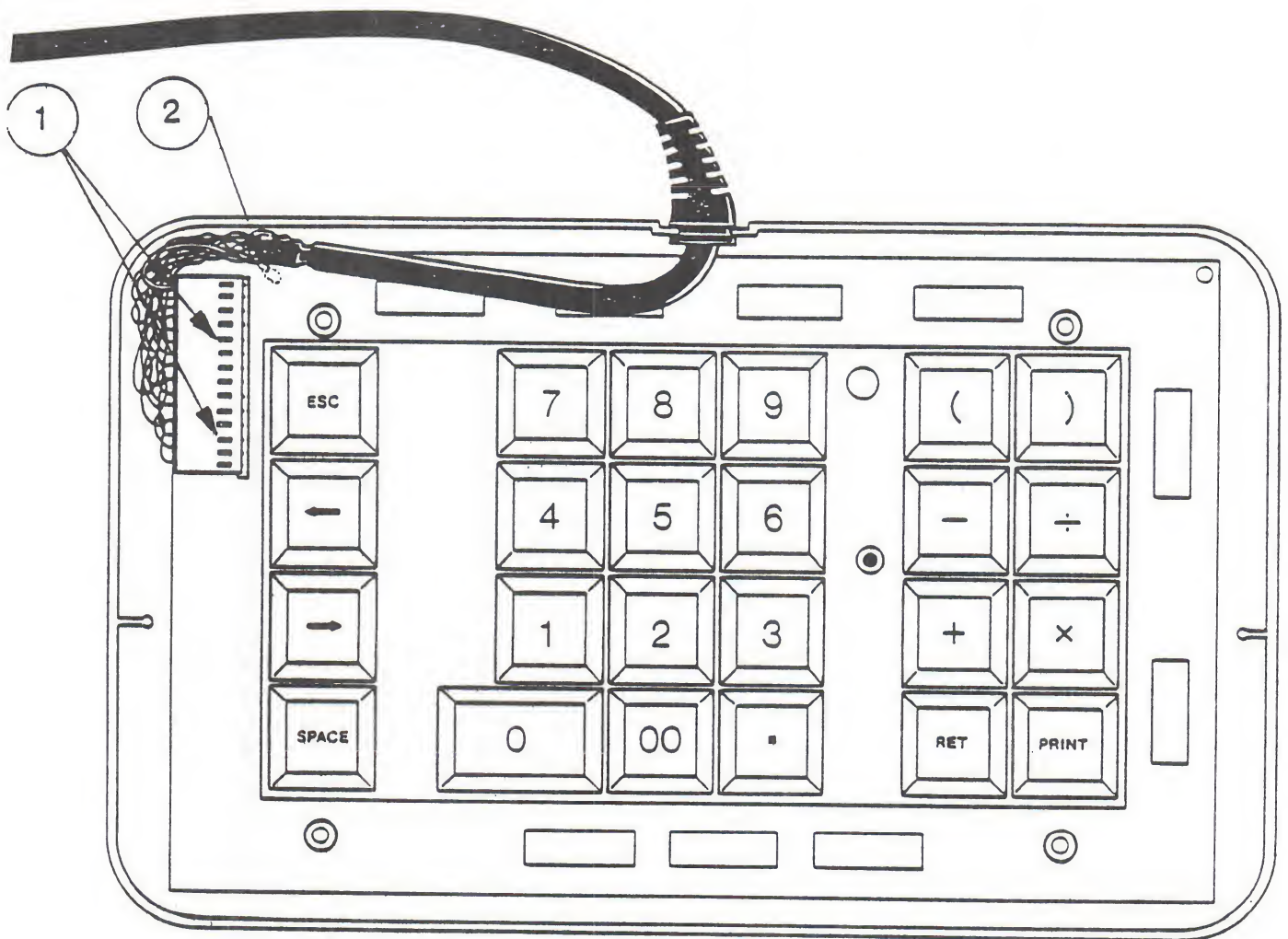Continue on page following illustrations.

FIGURE   D

4. Remove the 2 screws that are under the rubber feet you just removed.

5. Holding the case top to the bottom, turn the pad back over.

6. Remove case top by lifting off.

7. If you are replacing the CABLE ONLY, skip this step. Get the exchange keypad assembly from spares kit and set it next to the customer's keypad assembly. Pry off the key caps ONE AT A TIME, placing the cap from the customer's pad on to the new pad at the same location.

8. Note how the cable is laid and how it exits the case as shown in Figure D. Lift out customer's pad and place on normal soldering surface. (This step might not be applicable in swapping the keypad assembly.)

9. Carefully unplug the cable connector noting that the grooves of the cable connector are face up (see Figure D, #1).

10. Use a soldering iron to unsolder the grounding wire that is attached to the upper left side of the pad (see Figure D, #2)..

11. Get the appropriate cable (new one if you are replacing the cable, old one if this is a keypad swap) and plug it into the appropriate keypad assembly (old pad if this is a "cable only" swap, new pad if you are replacing the customer's pad). Note that the grooves of the cable connector are face up (see Figure D, #1).

12. Solder the ground wire to the designated area at the upper left side of the pad (see Figure D, #2).

STOP HERE! If you are CABLE SWAPPING, return to step 6 of the Troubleshooting Guide. If you are SWAPPING THE KEYPAD ASSEMBLY, return to step 8 of the Troubleshooting Guide. Do NOT reassemble keypad at this point.

13. When reassembling keypad, be sure the cable is laid correctly in the case bottom and that it points down as it exits the case as shown in Figure D. Be careful that all wires are set INSIDE the bottom of the case so none get pinched when the top is secured in place.

14. Replace case top. Turn pad over and replace 4 screws and LOWER rubber feet.

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CABLE FROM NUMERIC KEYPAD

U-SHAPED GROUND CLIP

①

KEYPAD
INTERFACE
BOARD

PAN HEAD

FLAT HEAD

APPLE MOTHER BOARD

FIGURE E

PIN 1 OF P-3 CONNECTOR
(INTERFACE BOARD)
TO MATCH
PIN 1 OF CABLE
(PURPLE WIRE)

RIBBON CABLE CONNECTOR
FROM APPLE KEYBOARD

KEYPAD INTERFACE BOARD

SHIELDED CABLE FROM
NUMERIC KEYPAD

P-3

U2

P2

PIN 1
(CABLE CONNECTOR)
TO MATCH
PIN 1 OF J1
(INTERFACE BOARD)

A7

APPLE MOTHER BOARD

PIN 1 OF P2
(INTERFACE BOARD)
TO MATCH
PIN 1 OF A7
(APPLE MOTHER BOARD)

FIGURE   F

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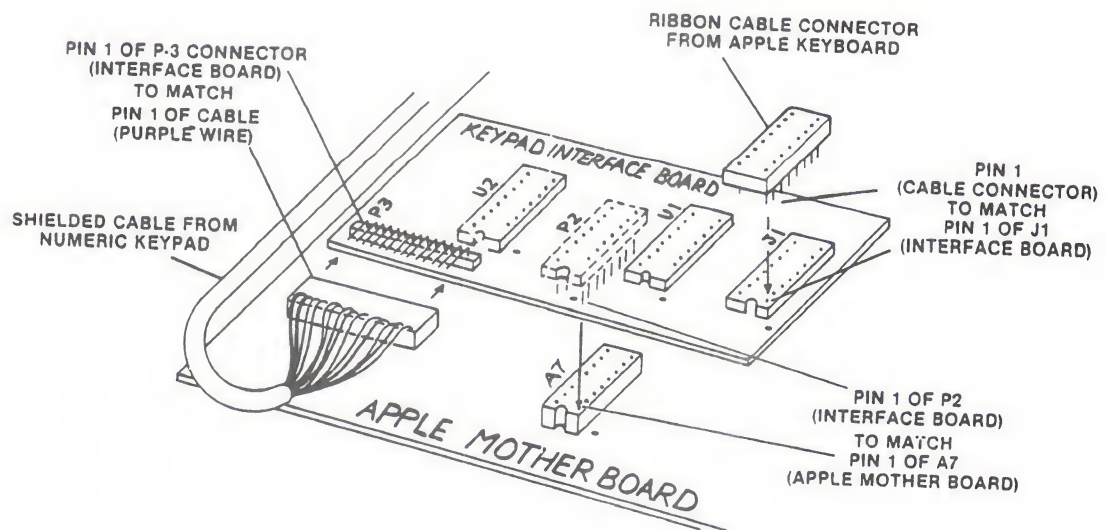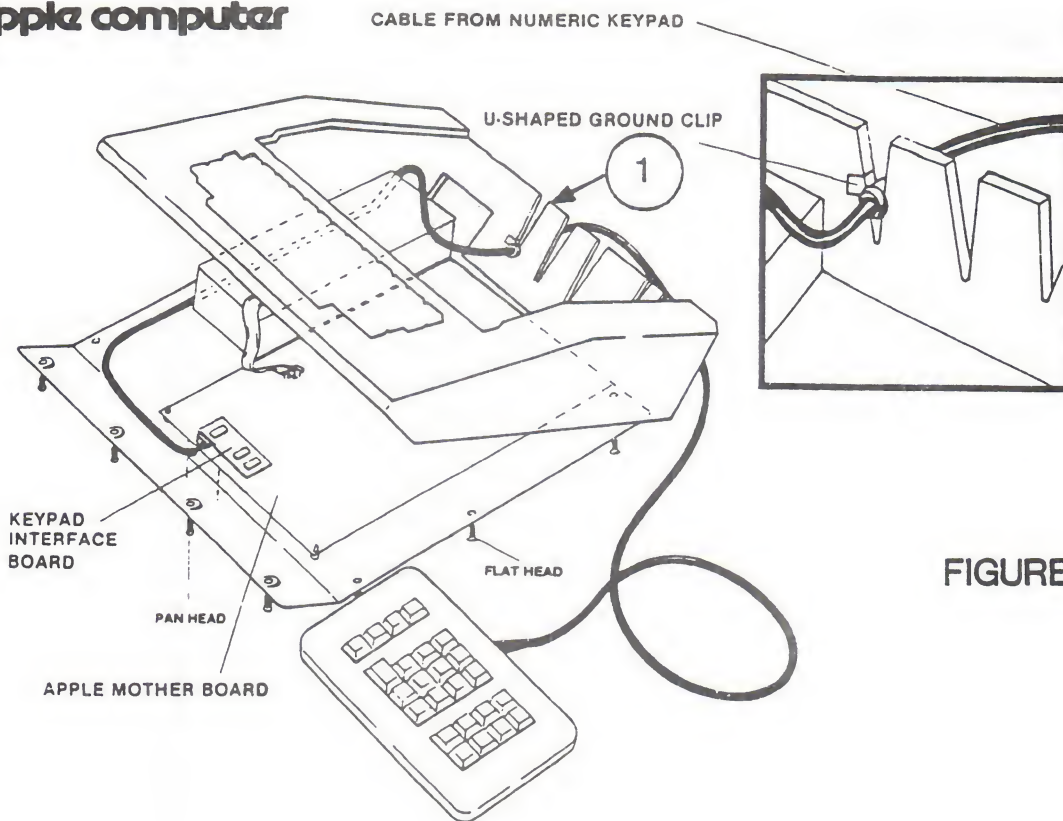
RECONNECTING KEYPAD TO APPLE

15. Complete these steps to reconnect numeric keypad to Apple.

    a. Set housing back on Apple base (do NOT set screws in place yet!)
    b. Thread the cable through a notch in the rear of your Apple.
    c. Slide the little u-shaped ground clip on the cable down the edge of the notch to secure the ground to the Apple case. (see Figure E, #1)
    d. Plug interface board connector P2 into mother board socket at A7. Be sure to match up P2 pin 1 to A7 pin 1. Plug keyboard connector into keypad interface board connector J1. Be sure to match up pin 1 - J1 to pin 1 keyboard connector. (see Figure F)
    e. Holding both base and housing, turn Apple upside down so keyboard rests on foam pad.
    f. Install four lock washers and pan-head screws at front of base.
    g. Install six flat-head screws at three outside edges of Apple base.
    h. Turn Apple right side up, reinstall lid, and reconnect other cable connected items and the power cord to Apple.

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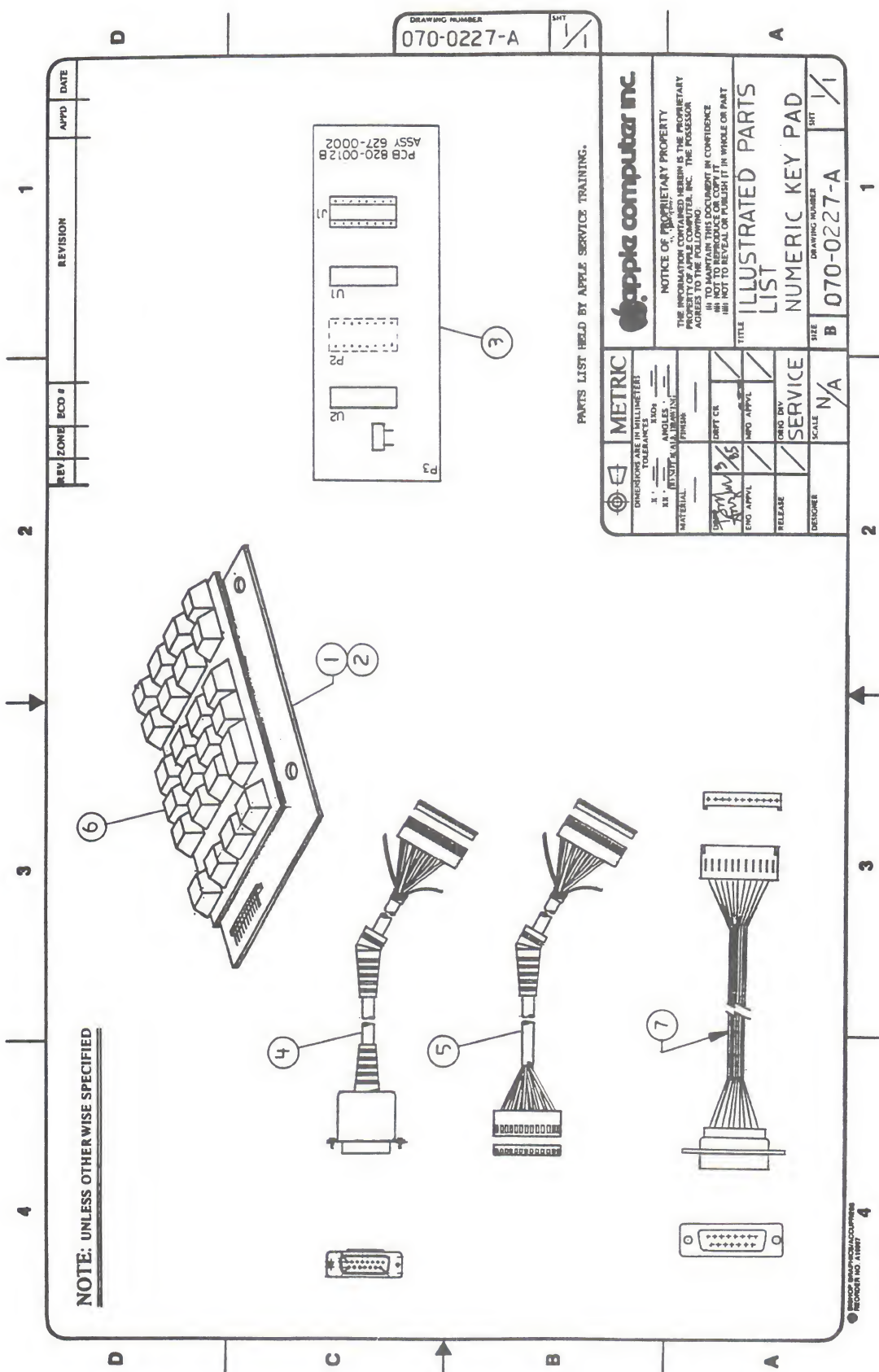## Numeric Keypad Technical Procedures

Section 2

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Numeric Keypad, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

Contents:

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NUMERIC KEYPAD

Item	Part No.	Description
1	661-95092	Keyboard II
2	658-4040	Keyboard IIe
3	658-0005	Assy, PCB, Interface Keypad II
4	590-0130	Cable, Numeric Keypad IIe
5	590-0119	Cable, Numeric Keypad II
6	658-7008	K'cap Set, Numeric Keypad II
7	590-0129	Interconnect Cable, Numeric Keypad IIe ‖

The following items can be found in the Macintosh section of the Technical Procedures Binder:

590-0144	Keyboard/Keypad Cable, Macintosh
658-4045	Macintosh Keyboard

The following keyswitches can be found in the Keyboard section of the Technical Procedures Binder:

705-0070	Alps Long Stem Keyswitch
705-0075	SMK Keyswitch Short Stem